Orlando Allen

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REPORT

ON THE

Alleghany Iron and Coal

MINING COMPANY'S PROPERTY,

IN

McKEAN COUNTY, PENNSYLVANIA.

NEW YORK:
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1856.

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PREFACE.

Office of the Allegany Iron & Coal Co,
No. 5 Wall St., July 1, 1856.

The Coal and Iron Lands, now the property of the Allegany Iron & Coal Company, were selected and secured for that Company before public attention had been directed to the vast field known as the "McKean Coal Field." Since the purchase of the property by the Company, valuable coal and iron lands of that field have been secured by capitalists, mines have been successfully opened, and a railroad from Buffalo to the locality spoken of has been commenced and will be completed during the current year. At the time of the purchase and even at the time when Professor Richardson made the survey, the results of which are embodied in the annexed Report, the owners of this property were not aware that any more easy or economical means of transportation would be offered the Company than the slack water improvement referred to in the annexed Report; but now the early completion of a railroad from the immediate vicinity of the tract to a constant and favorable market is known to be certain.

It may be proper here to state that this tract, having been selected before any speculative demand had grown up for the lands of the McKean field, by a gentleman thoroughly versed in the selection of both coal and iron lands, and for the purpose of establishing a legitimate mining and manufacturing business, less regard was had to the area than the intrinsic value of the property. It would have

been easy, while negotiating for the 200 acres which were known to be of great value, to have added thousands of acres of little or no value as coal and iron lands, at small expense, if it had been the object of the Company to rely for success on the *number of acres* in their tract, rather than on the *value of their coal and iron deposits.* Such, however, was not their object, and they have secured what they originally sought and what has received the unqualified encomiums of every expert who has visited the estate, and they are confident that the tract they have secured contains all that can reasonably be desired.

The title to the property of the Company is perfect, and the lands are subject to no liens or incumbrances whatever, the purchase money having been fully paid. Contracts for the erection of works in accordance with the plans of Professor Richardson are now being made and it is the design of the Company to complete their arrangements for mining and for the manufacture of iron without delay.

Stockholders and others may receive more complete information in relation to this estate and the operations of the Company, by application at the office of the Company, No. 5 Wall street, New York, or to the agent of the Company at the mines.

For the Directors,

OSSIAN GREGORY,
President.

MONT. GIBBS,
Secretary.

The Keating Coal and Iron Mines,

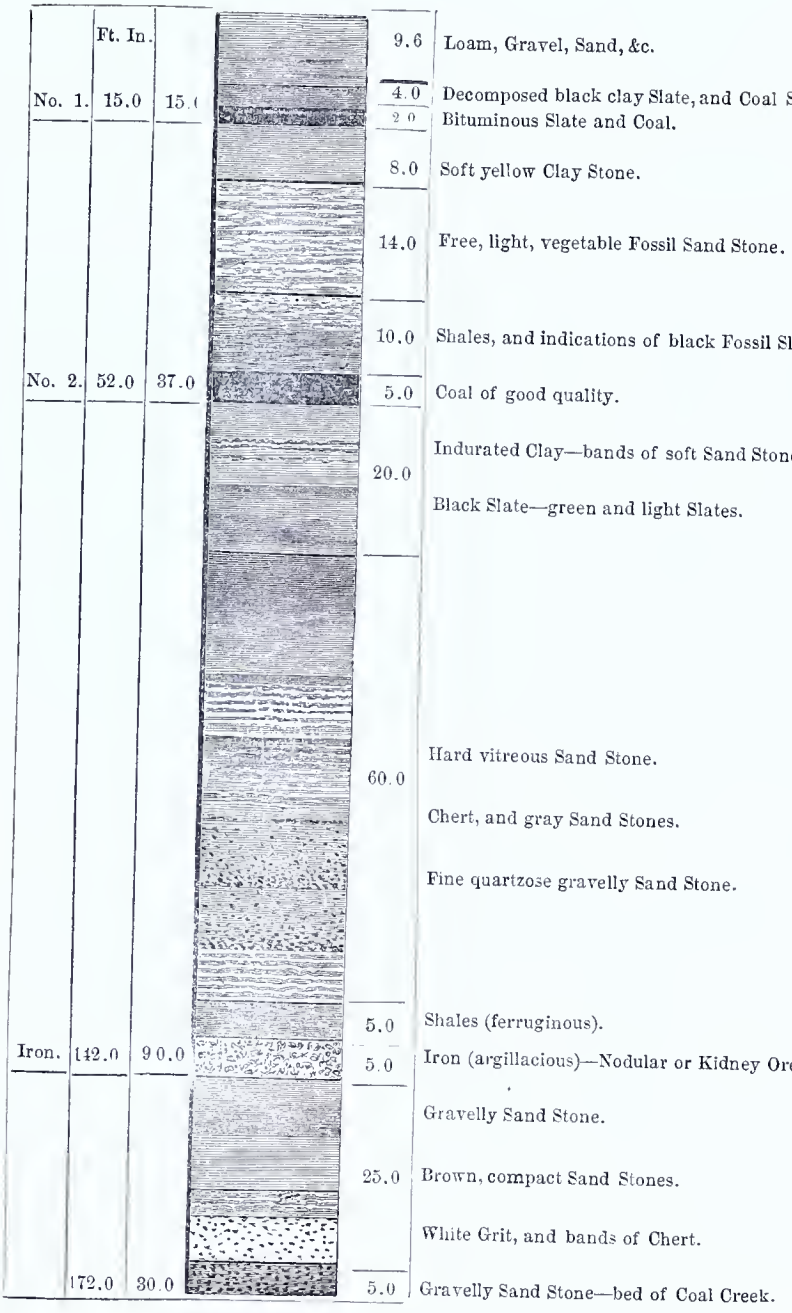
McKEAN COUNTY, PENN.

Five miles below the village of Smethport, in the township of Keating, McKean County, Pennsylvania, and about 30 miles south-southwest from the town of Olean, Cattaraugus County, New York, in the centre of the great coal field of this district, is situated the property of the Allegany Coal and Iron Company. It embraces an area of somewhat over 200 acres, the whole of which is underlaid with seams of the richest bituminous coal and beds of iron ore: the surface is a dense primitive forest of the heaviest growth of timber. Through its entire length runs a small mountain stream called Coal Creek, being a tributary of Potato Creek, which falls into the Allegany river a few miles below. The general contour of the land is gently undulating. Denudation has not yet, in this part of the coal field, furrowed out any very great ravines or valleys: comparatively speaking, it may be said to be almost tableland, for the elevations are quite of an insignificant height. In giving my views of this valuable mineral property, I must beg it to be understood, I have made no instrumental survey of the estate; my calculations are only deduced from surface inspection. I can, therefore, in this brief report, give but an outline of its geology; but as the thing is so simple and unmistakeable in its external indications, any person at all acquainted with coal measures, could decide its identity. It is seldom I have the opportunity, at first sight, to decide in my own mind on the merits of a mineral property; but this is one that admits of no alternative; it is self-evident and incontradictable. My remarks, therefore, will be very concise.

The Measures.

A glance at the following section will show it to belong to the true carbon ferous, or coal-bearing, strata. The land being so flat, I have not been able to extend the section over 172 feet in depth. This is taken (by guess work) in a line with the explorations. The order of stratification is taken on the slope of the hills where the outcrop of rock may be seen, and reduced to a vertical section by the angle of inclination, or dip of the strata, as they occur.

Vertical Section of Strata.



	Ft.	In.		
			9.6	Loam, Gravel, Sand, &c.
No. 1.	15.0	15.0	4.0	Decomposed black clay Slate, and Coal Shales.
			2.0	Bituminous Slate and Coal.
			8.0	Soft yellow Clay Stone.
			14.0	Free, light, vegetable Fossil Sand Stone.
			10.0	Shales, and indications of black Fossil Slate.
No. 2.	52.0	37.0	5.0	Coal of good quality.
			20.0	Indurated Clay—bands of soft Sand Stone.
				Black Slate—green and light Slates.
			60.0	Hard vitreous Sand Stone.
				Chert, and gray Sand Stones.
				Fine quartzose gravelly Sand Stone.
			5.0	Shales (ferruginous).
Iron.	142.0	90.0	5.0	Iron (argillacious)—Nodular or Kidney Ore.
				Gravelly Sand Stone.
			25.0	Brown, compact Sand Stones.
				White Grit, and bands of Chert.
	172.0	30.0	5.0	Gravelly Sand Stone—bed of Coal Creek.

From this it will be seen that there is already at this shallow depth two seams of coal, and one of iron opened on. These are merely surface deposits; and although the second one will amply repay the cost of working, yet, when the winnings are made on the lower seams, very little notice will be taken of those now open.

No. 1, or Upper Seam.

This is cut near Mr. Ormsby's house on the adjoining estate, and is only about 13 feet from surface. The seam is apparently about 2 feet thick; and although it contains films or strings of very fine bituminous coal, yet it would be more proper to class it as a strata of "bituminous slate." I have been informed that in one of the adjoining* hills of greater elevation, and distant some 3 miles, that a seam of cannel coal, 4 feet 10 inches thick, has been opened. I have examined some of the specimens, and am inclined to think that this thin seam of bituminous slate is a remnant of the same seam of cannel, but that its upper portion has been removed by disintegration, through lying close to the surface.

No. 2, or Second Seam.

As a shallow seam, and that to near its outcrop, its appearance presents one of extraordinary promise; indeed it is all any reasonable person could desire. I shall call it a 5 feet seam, 3 feet of which will be a clean, marketable coal. An open cutting has been made through the loose *debris* about 80 feet, and an adit level driven in nearly 40 feet; the depth at the end now from surface is not more than 16 feet. This drift is carried on the floor of the seam on the rise; the strata in nearly horizontal; its dip, which is northwesterly at this spot, does not exceed 1 in the 100, being just about sufficient to give a good drainage. The coal commences at the mouth of the level, in a

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* Mr. S. A. Backus, of Smethport, a gentleman interested in coal properties, also reported on by Dr. Salisbury, one of the States' geologists.

bed of loose shale. At this point it is not more than 9 inches thick, but at the end it is enlarged to two feet thick. The floor is perfect, but the roof has not yet got into a settled country. Every yard driven in depth, the slate is seen to diminish, and the coal to increase in quantity; an extension of 100 feet in this drift will prove the thickness of this seam, and, as I have said before, will be found to be about 5 feet thick, having a roof of vegetable fossil slate and a floor of hard laminated sandstone—course, soft sandstone—indurated clays, followed by alternating series of black, green, and light blue slates, for about 20 feet in thickness. The black slates contain alum and iron pyrites. They are carboniferous, and often contain sufficient bituminous matter to render them combustible when in large masses after a considerable exposure to the atmosphere. The water that issues from the level comes down from the roof, which is a good indication: it shows the seam is tight and compact. The coal is regular: its cleavages are all right-angled with the plane of its deposition; consequently, it will break out cubical, and in working make a much larger per centage of round coal, with a corresponding diminution of slack. This is a matter of considerable importance. I did not find any sulphur or lime in the partings; another great advantage, as the coal will retain its bright, lustrous appearance when in the market. Coal that has carbonate of lime, or sulphur, in the partings, tarnishes when exposed to the atmosphere, particularly if not kept under cover; it disintegrates rapidly, causing much waste in transportation, and will not bear frequent handling. The coal of this property, I think, will work large, and resist without crumbling several transhipments. There are at present several thin courses of black slate in the seam, amounting in the aggregate to nearly one-third. In depth, these will become concentrated; and when the seam has got into a settled strata, I think all the slate will be confined to the centre, dividing the seam into two equal or unequal parts, a thing of very common occurrence. The specimens of coal I have forwarded to New York, I took of course from the outcrop. These, you are aware, form no criterion to judge the coal by. I have, therefore, not made any analysis of its properties; but I will venture to predict that when the seam is solid and settled, it will be found to give

something like the following proportions of its component parts.

Water	0.80
Carbon	50.00
Volatile matter	40.00
Earthy and waste	9.20
Sulphur	mere traces
	100.00

Its evaporating power, if applied to the generating of steam for stationary engines, I think, will be found economical, giving about the same average as the Newcastle, or north of England coals, being from $7\frac{1}{4}$ to $8\frac{3}{4}$.

I have kindled some of the outcrop coal. I found it to ignite quickly, burnt with a strong red flame, giving off the bituminous matter freely in dense opaque smoke: it retained a powerful incandescent heat a long time after the evaporation of its volatile constituents, which shows a large proportion of fixed carbon. Now, this coal will make an excellent bright, clean coke, which can be produced from the slack alone; its absence from sulphur will render it alike valuable for the foundry, the blast-furnace, or the locomotive.

In the absence of any practical survey to guide my calculations, or deeper explorations than those herein enumerated, it cannot be expected any positively correct estimate of the quantity of mineral in the lower measures can be made. The seam No. 2, I will, however, venture to say, will produce at least 4,840 tons of coal to the acre. Assuming that three feet out of the five is clean coal, its specific gravity I shall estimate about 1,250; a cubic foot will, therefore, weigh 78 lbs. or $1\frac{106}{2000}$ Ohio tons* to the cubic yard. Dispensing with fractions, say then one ton to the yard, which gives an equivalent of 4,840 tons to the acre. From this quantity in the ordinary way of mining, one-third is often wasted or lost by being left in pillar—by nar-

* The Ohio ton is 2000 lbs. The standard English ton is 2240 lbs.

row work—by inefficient ventilation—creep of floor, or falling of roofs, wasteful hewing, and other negligences. I say there is no occasion for such waste: 15 per cent is the very outside I should allow. In a shallow seam with no water overhead, or buildings to damage by subsidence of roof, the leaving of pillars is totally unnecessary. If the banks are properly wrought, nearly the entire seam of coal or iron can be removed; no permanent props are required. The waste in slack consequent on excess of cutting in narrow work is avoided; the works progress with greater rapidity; and if care is taken at the early commencement to construct proper goaf roads, the ventilation can be made far more perfect, at the same time the wagon-roads and air-courses are free from obstructions throughout the entire winnings.

The Lower Measures.

An examination of the upper series of strata will show they belong to the most modern period of the formation. The fossil plants have scarcely, in some instances, lost their vegetable fibrous organism: others are bituminized partially, or in a state of transition; some are entirely carbonized, presenting in their cross fracture the appearance of wood charcoal. We are accustomed to look upon these things, when compact rocks lie beneath, as an unerring index of the strata being superincumbent to measures of a far more prolific and genial character. Had no other mines been opened in this neighborhood, I should have said there are numerous seams of coal below; but no predictions are required, as already both on the east and west of this property four seams of coal, varying from four to eight feet,* have been laid open above water-level of the Allegany river; I am not acquainted with their relative positions or altitudes, but think the second seam here described must be one of the upper series. I should look for the next seam, No. 3, about 90 feet below the iron, or 60 feet below the bed of Coal Creek, at the site of the present workings, making 232 feet from surface at the highest point of the estate.

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* Mr. Casey, Bradford, McKean Co., Pa. Mr. S. A. Backus, Smithport.

The general stratification of the country being so gentle in its dip, the identity of eaeh seam can readily be ascertained by taking their respective altitudes, and ealculating the angle of depression, and distance of each colliery now working I shall. therefore, without hesitation put it down that there are four seams of fine coal at easily accessible depths above deep valley level, whose aggregate working thickness is not less than 15 feet or five yards, the gross product of which will be 24,200 tons to the acre; from this quantity a deduction of 25 per cent. may be made, leaving in round numbers 18,000 tons to the acre, or 3,600,000 tons of marketable coal within the boundaries of the estate; and this quantity is all attainable at the very insignificant depth of 130 fathoms from surface. It may be imagined by some, that this set, whieh only contains 200 acres, is too small a thing for a public eompany; but just contemplate the immense amount of mineral wealth below this said 200 aeres, caleulate the time it will take to work out, the enormous labor to be expended neeessary to effect it, and the sum total of profits. The sequel, I am much inclined to think, will amply satisfy the avarice of the most grasping stockholder. It is a good little colliery that throws up 300 tons a day, working regularly 240 days a year. At this rate, it will take just 50 years to exhaust the coal in the first four seams; and after this is effected, it will take more than half a century to remove those that lie again below valley level.

The next thing to consider in conection with this property, is

The Iron Ore Beds.

I have not yet had time to sufficiently make up my mind on the value of the metallic minerals contained in this estate. About 90 feet below the second seam of coal, and 30 above the creek, lies imbedded in a strata of shale, a bed of argillacious iron ore; it is found in a nodular form, and known I believe generally in this country as "Kidney Ore:" it is the compact carbonate, and gives an average of about 25 per cent. of metallic iron. The samples I have forwarded to New York are selected as some of the best, therefore not a fair sample to judge by; they will assay, I think, to over 35 per cent. I could not

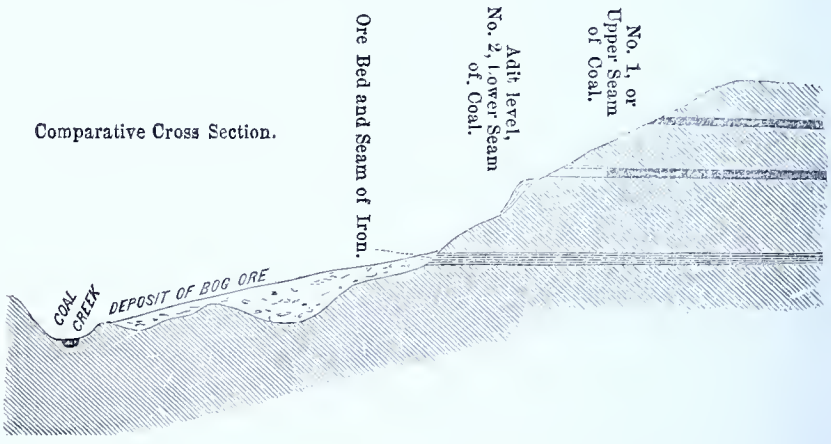
very well decide the thickness of the bed, as the workings have not been driven into the solid rock. At the spot where I broke the specimens, the bed was four feet thick. The angular pieces, which appear quite solid, are hematites; they result from the decomposition of the carbonates, and are found filling up the interstices between the nodules and loose shale: there is evidently an immense deposit; and it can be mined or quarried at quite a nominal cost: all that is necessary is to open a breast the entire width of the outcroping shale, which is only five feet from surface, and work the ore away the entire length of the sett. The greatest expense attending this, will be the spalling and picking the ore. No machinery is wanted more than a 12 head stamps, or a Cornish crusher. If stamps are used, no picking is required, as the stripping pits will catch the ore while the waste washes away with the water. I am not aware that low grade ores are prepared in this way in this country: it does very well if care is taken with the supply of grate water. I should, however, prefer the crusher, as 100 tons a day can be run through with the greatest ease. Stamping by the dry process is a very tedious method, and consumes a deal of labor. This ore could be raised, dressed and sampled so as to give a produce of 30 per cent. for one dollar per ton, and I am of opinion would pay a very handsome profit by being worked into wrought iron by blooming. The expense of three or four forges would not amount to much; water-power for this purpose may be obtained by daming the creek close by the ore bed, while the fine hardwood timber, with which the forest is so thickly studded, would supply charcoal of the most superior quality, and in quantity not to be exhausted in a great number of years; in fact, so abundant is the timber in this locality, that it can be obtained in many places free of cost—the landowners giving the timber for clearing the land. I find that the cost of coaling on the large scale does not amount to more than 2½ cents per bushel; I therefore think the erection of bloomeries should be one of the first things to attract the attention of the company. According to my views, the entire cost of making good wrought iron, direct from the ore, will not exceed $24 per ton, thus:

3½ tons of 30 per cent. ore,	at	$1 00.....	$3 50
Crushing and washing,	"	0 25.....	0 87
250 bushels charcoal,	"	0 03.....	7 50
Bloomers' wages.....			10 00
Blast power (water).....			1 00
Wear and tear.....			1 13
			$24 00

I consider it unnecessary in this report, which must be considered purely in abstract, to give any practical details of either mining the coal or manufacturing the iron; but when I prepare a plan, specification, estimate, and valuation of the entire property, every important item will be treated on under its proper head, in detail.

The Bog Ore.

Between the outcroping of the bed of ore just described, and the creek, filling up all the hollows and benches in the hill-side, are extensive deposits of fine bog ore. This deposit is the effect


Comparative Cross Section.
Ore Bed and Seam of Iron.
Adit level, No. 2, lower Seam of Coal.
No. 1, or Upper Seam of Coal.
COAL CREEK
DEPOSIT OF BOG ORE

of the decomposition of the agillacious carbonates, emanating from the shales, and carried down by the water, it is precipitated in heavy beds mixed with alluvial matter. It is a hematite ore, better known, perhaps, under the scientific name of "Hydrated Oxide of Iron;" it presents various forms of structure. The specimens I have sent, are mostly of a bright yel-

low color; those of a bright red, have passed through the fire. This has been done to remove the earthy and vegetable matter with which it was mixed. I cannot estimate the quantity without admeasurement, and sinking a pit down to the shelf (rock) on which it lies; there is, however, a very large quantity. An assay has been made of some selected samples, and it was found to produce 58 per cent. of fine soft iron. This kind of ore will work well in the forges, and materially assist as a fluxing medium for the more obdurate and refractory ores; but on this subject more may be said hereafter.

The Timber.

This consists of almost every variety common to the country, but chiefly in cherry, birch, maple, oak, and hemlock; there is but little pine or other softwood. The cherry is unusually fine: I saw one tree that would cut nearly 4,000 feet of inch board, and was told by a person present (a lumberman) that it was worth, when converted, above $50 in the place. The hemlock is the largest I ever saw, and very abundant. This wood, although classed as soft timber, nevertheless makes very excellent charcoal.

Facilities of Transportation.

At a first glance at this district, the company's property would appear to be somewhat isolated; but in reality it is quite centrally situated, being only about 5 miles either way from railroad or canal; that is to say, when the two improvements now about being commenced, are completed. The first of these, is the Allegany River Navigation Company's projected slack-water navigation from Olean, in connection with the Genesse Canal, now open, up the Allegany river as far as Cowdersport, and up Potato Creek to Smethport. The act of incorporation was passed on the 29th of March, 1856, and the books of the Company are now open for subscription. The promoters of this work are sanguine of getting the waters navigable to Smethport within a very reasonable time. This line will be an economical medium for conveying the produce of the mines during eight months of the year to Olean, from whence it can

be conveyed, without transhipment, ninety miles, via the Genesee Canal, to Rochester, or by the various intersecting railways, to every part of the north, northwest, and northeast.

Coal Creek forms a junction with Potato Creek about three miles below Smethport, or twenty-six above Olean. A tram line may be constructed from the mines down the valley of Coal Creek to the wharves on the navigation; the distance is about five miles. It can be constructed of iron-edge rails of 15 lbs. to the yard, which will make a good, strong, permanent way; it will run over a gentle down grade all the distance. Over the cost of the metals, the expense of construction will be quite nominal, as timber may be had gratis, and the rental for right of way and occupation will amount to a very small annual sum. This tram line will pass through several coal properties, which, within a few years, will be set to work. It will open up immense heavily timbered forests on either side to the industry of the lumberman; it will greatly facilitate the speedy settlement of the fine agricultural slopes and bottom lands that branch out right and left in the whole ascent of Coal Creek valley; while the diminished cost of freight on transportation of the produce of the mines must render it a matter of paramount importance. Now, its entire cost will not exceed $12,000, on which amount expended, I believe a valuable revenue may be derived from tolls to be collected from other collieries and the lumber trade.

The next mode of conveying the coal and iron to market is the most reliable and constant, although not so economical. This is by the "Bradford and Buffalo Railway," now in progress. This line crosses the "New York and Erie Railroad," about six miles from Great Valley station, and is intended to connect with the Allegany Valley line, passing through Lafayette; it runs up the "Tunungwant" river, a tributary of the Allegany, and thence up the valley of the "Tunaette" into the coal and iron districts. A branch line of this Company will come within two miles of the mine; and I have no doubt but that arrangements might be made for its extension into Coal Creek valley.

While on the mines, I had the pleasure of meeting Mr. Williams and Mr. Casey. Mr. Williams is the Bradford and Buffalo Company's engineer. He informed me there was every

probability of their line being opened to within six or eight miles of this spot during the next twelve months, and that his Company intended to render every assistance to the several coal property owners as may lie within their power, compatible with their mutual interests. Mr. Casey is a gentleman largely interested in coal properties of this district. It is mainly due to his influence that this line of railway is being constructed. He is pretty well acquainted with the McKean coal field, and entertains very similar views to my own; or, to make a long story short, considers it—good enough.

The Coal Trade.

Under this head, I must plead an incompetency to describe. Nevertheless, there is one very prominent feature that must strike the attention of every one: It is the nearest coal field to the state of New York; that it is only twenty-four miles from the New York and Erie Railway; but seventy-five miles from the shipping port of Dunkirk, where the coal trade of Lake Erie may be made immense; one hundred and twenty miles from Rochester, which, with its populous neighboring towns, is in itself enough to take all the produce from these mines. On the same route is the opening into Lake Ontario; opening up the means of supply for the increasing demands of Hamilton, Toronto, Darlington, and other large towns on the Canadian shores, as well as those on the American side; and last, though not least, is the coke trade for the locomotives on all the lines of railways. Sooner or later, they must adopt the same fuel as the English lines. Even now, it is a question of some doubt whether wood, cheap and plentiful as it is at the present time (all things considered), is not more expensive than coke. However, be this as it may, all the slack made in the mine can be converted into coke, and all the coke thus produced find a ready market. As to the iron, I need make no comment; for everybody in this part of the State knows full well, every ton can be sold within a hundred miles of the mine, as fast as it can be produced.

Conclusion.

In this preliminary report, it will be seen I have merely seanned over the most prominent features of the property; I have said nothing of the fire-clay and fire-brick making; the limestone, and manufaeturing iron by the blast-furnaee; the distillation of mineral oils and other produets from the bituminous slates; the lumbering of the best timber, and the agrieultural improvements eonsequent on the elearing of the forests, &c. I hope some day to be able to enter into these details, as also to give a earefully delineated cross-seetion of the measures above valley level; also an accurate geographieal and geologieal one of the entire coal basin. I find, however, a difference of opinion exists among seientific men as to the probable depth of the coal measures generally in this seetion of the States; all, however, seem to agree, that nothing positive ean be deeided without a perfect geologieal survey of the distriet, or deep borings sunk in the strata. There is one thing, however, before elosing these remarks I must allude to, as it has a tendeney to prejudice the publie mind on the true value of all the properties in this loeality. A rumor has beeome current, amounting to a generally prevailing opinion among the resident inhabitants, that the eonglomerate rock (so called) which lies about midway between the valley level and summit of the hills, is the bottom of the measures; and that it would be futile in attempting to seek for eoal below it. I was informed of this immediately on my arrival at Olean. Several gentlemen I met, some of them interested largely in coal lands, appeared very anxious to hear my opinion on this matter. On my visiting the mines, I was very diligent, of course, in trying to diseover the abode of this "ominous geological phenomenon;" but my seareh was quite fruitless: I found nothing whatever of the kind. But on my return to Smethport, a gentleman of that village gave me a piece of fine gravelly sandstone, saying at the same time, "This is the eonglomerate, Professor So-and-so: tell us, is it the bottom roek of the eoal formation?" Now, a more erroneous view of the true conglomerate never would be taken. The same thing oecurs in every sedimentary strata, from the alluvium down to the transition. I am fully aware that most mining men, as well as geologists, indiscriminately call rocks com-

posed of pebbles or coarse grit and gravel, a conglomerate; but it is a misnomer, and should never be applied; the term gravelly or pebbly sandstones would be far more appropriate and conclusive. I contend that a rock, however fragmentary, composed of its own constituents by agglutination, is not a conglomerate proper. Pebbly sandstone strata are found under, in, and above the carboniferous formation in every part of the known globe where that system exists. The true conglomerate is composed of erratic *debris* of all the earlier rocks; it is supposed to be coeval with the diluvial era, a period when powerful ocean currents carrying masses of broken rock, the effects of volcanic action, abrading the surface and sweeping everything away of a friable nature, in certain definite directions, down to the metamorphic, or the primitive base. This was the date, and this the cause of the formation of the heavy beds of the true conglomerate. Such an hypothesis admitted, it becomes no more than feasible to conclude, such a formation would be the bottom or base on which repose the coal measures. Such, however, is the rule, but not the exception; there are secondary sedimentary conglomerates. I know of coal mines where this kind of true conglomerate lies on a bed of shelly brimstone, forming the super-strata of the measures; but as to gravelly sandstones, they are forming every day on every coast of the ocean, in every tidal estuary, and in the bed at the mouth of every rapid river; but for me to enter into a description of the various ramifications of this subject, would not be only inconsistent, but irrelevant, to the objects of this report. I will, therefore, briefly sum up the matter by saying, the supposed conglomerate rock seen at Smethport, is no conglomerate at all, and thus totally unworthy of notice.

The property I have examined and here partially described is one of great value; and if properly and economically worked, will afford long and amply remunerative dividends for the capital invested in its development.

CHARLES SAMUEL RICHARDSON,
Mining Engineer,
Southampton, Mass.
Late 15 *Old Broad street*,
London, and Cornwall, England.

APPENDIX.

An Approximate Estimate of the Cost of Erecting Iron Works and Opening the Mines, in McKean County, Penn., belonging to the Allegany Coal and Mining Company of New York.

EARTHWORKS.

Levelling ground for buildings and plant, cutting mill race, &c.....
Driving a pair of levels (or drifts) into the 2d coal seam, 50 yards, with the cross-cuts and stoppings, complete .....
Do., 50 yards into the iron ore seam, with shaft for ventilation connected with the coal seam above.....
130 yards edge rail tram road, for underground operations.....
Opening breast on the ore bed and laying down road.
New road, cut three miles through the woods to connect with the road now used up Farmer's Valley, being the outlet into the main road leading to Olean.
Putting down a bore to the 3d or 4th seam.....
Ventilating furnace, stack, and shaft.....

$2935 00

WORKS OF CONSTRUCTION.

The mill dam, flume, &c.....
Vertical saw-mill of the cheapest kind, with a cut-off saw and shingling machine.....
5 workmen's shanties, with one fitted up for the foreman, office, &c.....
25 horse-power steam-engine, with boilers, &c., complete, (second-hand.).....
New blast engine, with double cylinder and condensing chamber.....

4 improved hot-blast forges, with re-heating ovens, dampers, stacks, &c.....
2 trip-hammers, anvils, &c., (second-hand.).....
Set new rolls for small merchant iron.....
Smith's shop and tools, complete.....
Buildings—engine house, boiler stack, &c.....
Ore and coal sheds, office, carpenters' shop, bloomery sheds, weighing room, stables, &c.....
Tram road from ore bed to the mill.....
6 ore trucks, 6 coal trucks, 1 pair timber hoisters and chains, coal wagon (charcoal), 2 horses.....
2 mules, harness, &c.....
Stamps of 12 heads, with dressing floors and elevator, wagon and rails complete.....
Cranes, furnace tools, trucks, and weighing machine..
The office and fittings complete, (with accomodation for cooking and sleeping.).....
Barrows, planks, bars, shovels, jumpers, picks, cross-cut saws, powder cans, powder, safety fuse, oil, hemp, and tallow, blocks, saw, dag, &c.....

$9,025 00

STOCKS, &c., &c.

6 months' labor in the iron works, in which sum is included mining about 4000 tons of crop and bog ore, at $800 per month.....
Charcoal burners, woodchoppers, carters, and lumbermen, at $360.....
Freight on 200 tons iron to Olean, at $3.....
Hay, corn, iron, steel, nails and ironmongery, leather, rope, chains, and a general assortment of mine stores.
Miscellaneous, casualties, losses, &c.....

$9,040 00

MANAGEMENT, AGENCY, &c.

Engineers' work, survey of the estate, with topographical and geological plans; plans of the machinery

and plant, working drawings, estimates, contracts, superintendence of the works during their construction, and reporting on the progress to, and attending quarterly and other meetings of the Company.....

$750 00

Six Months' Salaries, &c.,

Captain of the mining department.....
Foreman of the iron works, the woods, coaling, lumbering, &c.....
Clerk.....
Manager of the whole works (President).....
Directory, N. York offices, secretary, and committees' traveling costs and expenses.....

$2,250 00

Summary.

Earthworks	$2,935
Works of construction, machinery, buildings, roads, &c.	9,025
Stocks, manufacturing, &c	9,040
Management, agency, &c	2,250
Engineering, &c	750
	$ 4,000

The above are the necessary works of construction; before which are complete, nothing in the way of working profit worthy of the name can be expected; but when once done, the works will be in first rate order. There will, however, in this period, be produced a considerable stock of working materials, part of which can be rendered available for market. It will consist of—

200 tons of bar iron, worth say $60	$12,000 00
2660 tons of clean iron ore, at $1	2,666 00
100,000 bushels charcoal, at 2½ cents	2,500 00
	$17,166 00

The returns of coal during the explorations will not be of any commercial value, and it will take six months longer, with a

further expenditure of about $3000, before any profit can be expected. After the drivings have penetrated the seams far enough to find it sufficiently good to be saleable, then the headway and heading courses will have to be drifted, the level course for regular drainage cut and secured, permanent line of tram rails laid, wagons made, and other appliances and appurtenances provided. But in opening the coal mine, I do not apprehend any additional capital will be required to be called up. There will arise, from surplus profits, a sum sufficient for this purpose, if the works are to be conducted on a small scale; but not if conducted on a scale commensurate with the merits of the property.

Let us now suppose all the aforesaid works are completed and in readiness to commence the forges all in full blast. Experience teaches us that there are only 240 net working days in a year, on an average of 10 years; and that the price of iron shall be regulated by the English market, which, at the present time is, for Welch merchant bars, £8 17s 6d per ton, equal to..... $43 04
Import duty 30 per cent..... 12 91
Freight, Liverpool to New York..... 5 00
Port charges and expences, $1 55..... 1 55

$62 50

We thus have the value of foreign iron, as now imported in this country, shown to be $62 50 per ton at the ports of Boston, New York, or Philadelphia. Taking this as a data on which to ground our calculations of the yearly value of the Allegany Company's mines, I will endeavor to show that they may, even by working on a small scale, produce a return in the way of profit, capable of making a dividend to the stockholders. I therefore run out the cost and produce as follows:—

By 960 tons of iron, the produce of 4 forges, each making 1 ton in 24 hours, working full up 240 days a year at the market price of $62 50 per ton, delivered on the canal wharf at Olean..... $59,000 00
To 3360 tons iron ore, at $1 00.....$3360
240,000 bushels charcoal, 2½ cts..... 6000

960 tons Bloomers' wages, $7	$6720	
960 tons rolling and trimming, $4	3840	
Agency and management	——	
About 7½ per cent. on produce	4425	
Carriage to Olean	3000	
Wear and tear of machinery, &c	2655	
10 per cent. interest on the sum of $20,000, cost of the construction of works	2000	
Depreciation—5 per cent., being equivalent to a 20 years' purchase, or value of real estate, the estimated value being about $100,000	5000	
	——	37,000 00
		$22,000

Leaving a net profit of $22,000, or 40 per cent. on the actual working returns.

The Extension.

If the ore beds will pay by the mode of working heretofore described, it will be desirable to enlarge the works. This can be done by increasing the number of forges, or working on a larger scale by means of the blast-furnace. Now, the latter will be preferable on account of smelting the low grade ores, many of which will not pay to dress up high enough for the bloomery, but will give from $7 to $12 per ton on a large scale. The mine will now have to be sunk lower and all the small coal reduced to coke. The railway must be made down Coal Creek to join the navigation in Potato Creek, and the amount of additional capital required for this will be about the following sum :—

Blast-furnace, capable of running out 15 tons pig metal per day	$12,000 00
Puddling furnace, refinery, rolling-mill with all its appurtenances complete	23,000 00
Engine and upcast shafts, sunk down to the 3d and 4th coal seam, pumps, pit-head, winding engine, cokeing ovens, wagons, &c	15,000 00
Dwellings, mine buildings, coal sheds, tips and	

screens, roads, &c.....	$3000 00
Stocks. floating capital, &c.....	20,000 00
Railway, 5 miles to navigation.....	12,000 00
	$85,000 00

To the above amount eventually $25,000 more will have to be provided for rolling stock, as it is not likely the public railways will build coal trucks (cars) expressly for this company, or even if they do, their charges will be at such a rate as to pay for them in 3 years. Experience has taught the North and South Wales coal owners that to have their own coal trucks they save about 50 per cent. The gross revenue from the property, when put in good working order, will amount to the following sum :—

Profits derived from 960 tons bloom iron, per annum,	$22,000
360 tons pig and malleable iron, procured from the blast furnace, at $8.....	28,800
72,000 tons coal, being the produce of the mines at the rate of 300 tons per day for 240 days, 75 cts...	54,000
Gross profit.....	$104,800

On a full paid-up capital of $250,000, the above sum may be yearly realized. It is assumed that only three months' credit is given, and the actual working capital is returned three times a year, and everything made to bear a profit. There are some contingencies, however, that must be taken into consideration, such as fluctuations in the metal market, losses, delays, and accidents incidental to all such works as mining and metallurgy. These are to be set against gross profits; but I am very well assured that, after making ample provision for those casualties and depreciation, a dividend of twenty per cent. may be declared annually.

CHARLES SAMUEL RICHARDSON,

Mining Engineer.

The following is the substance of a statement as to the value of the property of the Allegany Iron and Coal Company, made by Samuel Casey, Esq., a well known geologist, and who is one of the projectors of the railroad now in course of erection to the McKean field :—

"I am intimately acquainted with the estate owned by the Allegany Iron and Coal Company, and had made some examinations upon it before Professor Richardson's preliminary survey was made, and had pronounced the property one of great value. I had the pleasure of meeting Professor Richardson upon the estate while he was engaged in making his survey. He had an opportunity of comparing my views as to its value with his. His report, a copy of which I have seen, meets my entire approbation and concurrence. If I were to differ at all with him, it would be in the statement of my conclusions as to the value of the estate. With a prudence and caution, for which I learn he is noted, he has, in giving his conclusions, though he certainly conveys a high estimate of its value, spoken *less highly* of the value of the property than its merits will warrant. I am free to state that I have nowhere seen deposits of iron and coal, of so great value, upon a similar area, nor have I seen combined, in so small a compass, so many facilities for the successful prosecution of mining and manufacturing operations. If the operations of the Company are conducted with any reasonable degree of prudence and economy, very large returns must be realized."